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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/032,494	01/02/2002	Brian H. Nagamatsu	GENE0115	6988

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EXAMINER	
SUN, XIUQIN	

ART UNIT	PAPER NUMBER
2863	

DATE MAILED: 06/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/032,494	NAGAMATSU, BRIAN H.	
	Examiner	Art Unit	
	Xiuqin Sun	2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23,25-29,38-53,55 and 56* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23,25-29,38-53,55 and 56* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☒ Other: *All references in the record.*

RESPONSE TO AMENDMENT

Specification

1. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Specifically, the Abstract of the Disclosure is objected to because it can not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-8, 12, 19, 23, 27-29, 38-43, 53 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Canada et al. (U.S. Pat. No. 5854994) in view of DeVito (U.S. Pub. No. 20010056225).

Canada et al. teach a system comprising: a remotely situated plurality of sensors that sense information (Figs. 1 and 3; col. 5, lines 6-35 and lines 45-64); a locally situated workstation that receives the information from the remotely situated plurality of sensors in the form of a set of data (Figs. 1 and 4; col. 5, lines 6-35; cols. 6-7, lines 64-8 and cols. 7-8, lines 60-9); and a Fast Fourier Transform (FFT) analyzer interfaced with the plurality of sensors and workstation to receive information from the plurality of sensors in the form of time domain data points, to transform the data points into frequency domain data points prior to transmission as a set of data from the plurality of sensors to the locally situated workstation (Fig. 3; col. 6, lines 27-46). Canada et al. further teach that: said FFT analyzer is interfaced with the workstation to receive an input from the workstation to control the plurality of sensors (Fig. 3; col. 7, lines 9-28); the plurality of sensors monitors a test object and generates sensor signals (Figs. 1-3; col. 5, lines 6-64); the plurality of sensors monitors a test object and generates sensor signals, the system further comprising a data acquisition system that acquires the sensor signals from the plurality of sensors and digitizes the plurality of sensors into a digitized sensor data signal using an analog-to-digital converter

device (Figs. 1-3; cols. 5-6, lines 6-16); the plurality of sensors comprise a vibration sensor (col. 5, lines 6-20); the plurality of sensors comprise a vibration sensor selected from the group consisting of an accelerometer, a proximity probe and a fiber optic accelerometer (col. 5, lines 45-64); the plurality of sensors comprise a temperature sensor selected from the group consisting of a thermocouple, a thermistor, an RTD and an infrared sensor (col. 5, lines 45-64); the plurality of sensors comprise a time code generator that provides a measure of time (Fig. 3 and col. 6, lines 7-16); a central control system that includes an alarm apparatus that generates an alarm trigger whenever a sensed digitized data signal exceeds a selected alarm threshold (col. 6, lines 27-46); said workstation comprises an output device selected from the group consisting of a plotter and a color printer (col. 12, lines 23-31); said workstation comprises a processing device and a storage device selected from the group consisting of a hard disk, a writable CD and a flexible disk (cols. 7-8, lines 60-9); said workstation comprises an input device selected from the group consisting of a keyboard, a mouse and a wireless mouse (cols. 7-8, lines 60-9); said FFT is remotely situated in association with the plurality of sensors (col. 5, lines 45-64); a switching apparatus remotely situated and controllably connected to the plurality of sensors to permit selection of a sensor of the plurality from the workstation (col. 6, lines 17-35; col. 9, lines 21-45 and col. 12, lines 33-39).

Canada et al. further teach the means and steps of: monitoring a test object with the plurality of sensors, generating sensor signals from the monitoring and acquiring the sensor signals with a data acquisition system that digitizes the

plurality of sensors into digitized sensor data signals (Figs. 1, 3 and cols. 5-6, lines 45-6); said plurality of sensors generate vibration data points (col. 5, lines 6-20); said plurality of sensors generate temperature data points (col. 5, lines 45-64). The teaching of Canada et al. further includes: sensing the frequency domain data points at the workstation and generating an alarm whenever a sensed digitized data signal exceeds a selected alarm threshold (col. 12, lines 23-39). Canada et al. further teach a method, comprising: selecting a sensor according to the selected sensor command in the remote controlled switching apparatus (col. 6, lines 17-35; col. 9, lines 21-45 and col. 12, lines 33-39).

Canada et al. do not mention explicitly: said FFT analyzer transforming the data points into a lesser number of frequency domain data points to facilitate transmission as a set of data to said workstation; said FFT analyzer generates a display from the time domain data points, the display is selected from the group consisting of spectral amplitude versus frequency display, an octave display, a 1/3 octave display, a 1/6 octave display, a 1/12 octave display, a 1/24 octave display, an at least 100 line display and a waterfall display; said workstation comprises an audio monitoring system which is selected from the group consisting of a speaker, a surround sound speaker system, and a headphone; said workstation comprises an e-mail message system as one of the output devices; said system is used to monitor a test object selected from the group consisting of a steam turbine, a gas turbine, a generator, a heat recovery boiler, an aircraft engine and a gear unit.

It is well known in the art of FFT technique that any finite time series may be represented as a combination of a finite number of frequency domain data points. The number of frequency domain data points of interest can then be selected by an on-demand truncation of the Fourier harmonic series according to a predetermined accuracy of the transform. It would have been obvious to one having ordinary skill in the art at the time the invention was made to select any required number of data points in the frequency domain to represent the original measurement in the time domain in order to facilitate the subsequent data analysis or transmission. It is deemed that the system taught by Canada et al. is broad enough to cover the above limitation recited in claim 1 of the current application.

DeVito teaches a FFT analyzer comprising a display selected from the group consisting of spectral amplitude versus frequency display and a waterfall display (section 0049).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of DeVito in the invention of Canada et al. in order to carry out a FFT analysis on the input data points and examine the output in many formats in either time domain or frequency domain (DeVito, section 0049).

4. Claims 9 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Canada et al. in view of DeVito, as applied to claims 1 and 38 above, and further in view of McGirr et al. (U.S. Pat. No. 5736937).

Canada et al. and DeVito teach a system that includes the subject matter discussed above. The combination of Canada et al. and DeVito do not mention explicitly: said plurality of sensors comprise a probe that provides a once per revolution signal.

McGirr et al. teach an apparatus for wireless transmission of shaft position information, comprising: a probe that provides a once per revolution signal (col. 2, lines 16-45).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of McGirr et al. in the combination of Canada et al. and DeVito in order to accurately monitor the shaft position information as a measurement for the performance of a rotating machinery (McGirr et al., Abstract).

5. Claims 10, 11, 45 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Canada et al. in view of DeVito, as applied to claims 1 and 38 above, and further in view of Trolinger et al. (U.S. Pat. No. 5682236).

Canada et al. and DeVito teach a system that includes the subject matter discussed above. The combination of Canada et al. and DeVito do not mention explicitly: said plurality of sensors comprise a strain measurement sensor; said strain measurement sensor is selected from the group consisting of a strain gauge and a thermal strain system; and said plurality of sensors generate measurement signal data points.

Trolinger et al. teach a system and method for remote measurement of near-surface physical properties using optically smart surfaces, comprising: a

strain measurement sensor which is selected from the group consisting of a strain gauge and a thermal strain system, wherein measurement signal data points are generated (col. 7, lines 18-30; col. 9, lines 60-67 and col. 10, lines 1-25).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of Trolinger et al. in the combination of Canada et al. and DeVito in order to monitor the mechanical and thermal strain condition of the test object (Trolinger et al., col. 1, lines 64-67 and col. 2, lines 1-29).

6. Claims 13, 14, 16 and 47-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Canada et al. in view of DeVito, as applied to claims 1 and 38 above, and further in view of Lang et al. (U.S. Pat. No. 5521482).

Canada et al. and DeVito teach a system that includes the subject matter discussed above. The combination of Canada et al. and DeVito do not mention explicitly: said plurality of sensors comprise a voltage sensor, a current sensor and a pressure sensor; and generate time coded signal data points.

Lang et al. teach a method and apparatus for determining mechanical performance of polyphase electrical motor systems, comprising: a voltage sensor (col. 4, lines 6-34; col. 19, lines 35-67 and col. 20, lines 1-11); a current sensor (col. 4, lines 6-34; col. 19, lines 35-67 and col. 20, lines 1-11); and a pressure sensor (col. 7, lines 1-25); wherein time coded signal data points are generated (Abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of Lang et al. in the combination of Canada et al. and DeVito in order to determine electrical and mechanical performance characteristics of a test object such as a polyphase electric motor system (Lang et al., Abstract).

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Canada et al. in view of DeVito, as applied to claim 1 above, and further in view of Milkovic (U.S. Pat. No. 4286214), Robert C. Miller (U.S. Pat. No. 4255707) and Felgenhauer (U.S. Pat. No. 5602708).

Canada et al. and DeVito teach a system that includes the subject matter discussed above. The combination of Canada et al. and DeVito do not mention explicitly: said plurality of sensors comprise a current sensor selected from the group consisting of a Watt meter, a VAR meter and a speed meter.

Milkovic teaches the use of a Watt meter as a current sensor (col. 1, lines 15-51 and col. 7, lines 39-51).

Robert C. Miller teaches the use of VAR meter as a current sensor (col. 2, lines 57-67; col. 3, lines 1-23 and col. 19, lines 51-62).

Felgenhauer teaches the use of a speed meter as a current sensor (col. 3, lines 24-41 and lines 62-67 and col, 4, lines 1-12 and lines 40-56)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teachings of Milkovic, Robert C. Miller and Felgenhauer in the invention of Canada et al. an DeVito in order to provide a plurality of different approaches to measure the electric current signal of the

object under test (Milkovic, col. 1, lines 15-51 and col. 7, lines 39-51); (Robert C. Miller, col. 2, lines 57-67; col. 3, lines 1-23 and col. 19, lines 51-62); (Felgenhauer, col. 3, lines 24-41 and lines 62-67 and col, 4, lines 1-12 and lines 40-56).

8. Claims 17 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Canada et al. in view of DeVito, as applied to claims 1 and 38 above, and further in view of Niel Miller (U.S. Pub. No. 20020169569).

Canada et al. and DeVito teach a system that includes the subject matter discussed above. The combination of Canada et al. and DeVito do not mention explicitly: said plurality of sensors comprise a microphone which generates sound signal data points.

Niel Miller teaches a system and method a system and method for analyzing vibration signals, comprising: a microphone which generates sound signal data points (section 0024-0025).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of Niel Miller in the invention of Canada et al. and DeVito in order to provide an alternative for monitoring and analyzing vibration signals in a test object (Niel Miller, Abstract and section 0024-0025).

9. Claims 18 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Canada et al. in view of DeVito, as applied to claims 1 and 38 above, and further in view of Pryor et al. (U.S. Pat. No. 5004339).

Canada et al. and DeVito teach a system that includes the subject matter discussed above. The combination of Canada et al. and DeVito do not mention explicitly: said plurality of sensors comprise a camera which generates visual signal data points.

Pryor et al. teach a method and apparatus for determining physical characteristics of objects and object surfaces, comprising a video camera which generates visual signal data points for sensing the test object (col. 6, lines 1-13 and lines 34-67 and col. 11, lines 27-54).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of Pryor et al. in the combination of Canada et al. and DeVito in order to determine physical characteristics of test objects and object surfaces (Pryor et al., Abstract).

10. Claims 20 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Canada et al. in view of DeVito, as applied to claim 1 above, and further in view of Qian et al. (U.S. Pat. No. 6477472).

Canada et al. and DeVito teach a system that includes the subject matter discussed above. The combination of Canada et al. and DeVito do not mention explicitly: said workstation includes an audio monitoring system that allows an operator to hear a sensor signal; and said audio monitoring system selected from the group consisting of a speaker, a surround sound speaker system, and a headphone.

Qian et al. discloses a signal analysis system and method for analyzing an input signal acquired from a mechanical system. Qian et al. teach a workstation

system including an audio monitoring system that allows an operator to hear a sensor signal, and said audio monitoring system selected from the group consisting of a speaker, a surround sound speaker system, and a headphone (col. 8, lines 54-60; col. 9, lines 1-12 and lines 26-37 and col. 14, lines 9-27).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of Qian et al. in the combination of Canada et al. and DeVito so that a user may be able to listen to the acoustic representation of the input signal in situations where the original physical signal measured by signal measuring device is an acoustic signal, e.g., engine noise (Qian et al., col. 9, lines 1-12 and col. 14, lines 9-27).

11. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Canada et al. in view of DeVito, as applied to claim 1 above, and further in view of Lofall (U.S. Pat. No. 6484109).

Canada et al. and DeVito teach a system that includes the subject matter discussed above. The combination of Canada et al. and DeVito do not mention explicitly: said workstation comprises an output such as an e-mail message system.

Lofall discloses a system for collecting and analyzing machine vibration data, wherein an e-mail message system is included for outputting results of data diagnostics (col. 6, lines 56-67; col. 7, lines 1-5 and col. 11, lines 4-25).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of Lofall in the combination of Canada et al. and DeVito in order to overcome the long time lag and paper

trail that used to come with getting the information to other users remote to the system (Lofall, col. 11, lines 4-25).

12. Claims 25 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Canada et al. in view of DeVito, as applied to claims 1 and 38 above, and further in view of Smith, Jr. et al. (U.S. Pat. No. 6687654).

Canada et al. and DeVito teach a system that includes the subject matter discussed above. The combination of Canada et al. and DeVito do not mention explicitly: said FFT analyzer comprises a display of averaged data to reduce random signal fluctuations.

Smith, Jr. et al. teach techniques for distributed machinery monitoring, comprising a FFT analyzer for preprocessing the acquired data, wherein the FFT analyzer comprises a display of averaged data to reduce random signal fluctuations (col. 12, lines 44-67; col. 13, lines 1-43; col. 16, lines 56-67; col. 17, lines 1-3 and col. 18, lines 44-58).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of DeVito and Smith, Jr. et al. in the invention of Canada et al. in order to carry out a preprocessing process on the input data points before transforming the data points into frequency domain (Smith, Jr. et al., col. 12, lines 44-67; col. 13, lines 1-43; col. 16, lines 56-67; col. 17, lines 1-3 and col. 18, lines 44-58).

13. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Canada et al. in view of DeVito, as applied to claim 1 above, and further in view of Haseley et al. (U.S. Pat. No. 5610339).

Canada et al. and DeVito teach a system that includes the subject matter discussed above. The combination of Canada et al. and DeVito do not mention explicitly: said system is used to monitor a test object selected from the group consisting of a steam turbine, a gas turbine, a generator, a heat recovery boiler, an aircraft engine and a gear unit.

Haseley et al. disclose a method and system for collecting and analyzing machine vibration signatures to predict and to detect changes in machinery condition (see Abstract). Haseley et al. teach the use of the system for monitoring a test object selected from the group consisting of a steam turbine, a gas turbine, a generator, a heat recovery boiler, an aircraft engine and a gear unit (col. 3, lines 7-67 and col. 4, lines 1-12).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the teaching of Haseley et al. in the combination of Canada et al. and DeVito since the system taught by Canada et al. and DeVito is broad enough to be applicable to any type of machine (Canada et al., col. 1, lines 5-10 and col. 2, lines 17-21), such as but not limited to, one selected from the group consisting of a steam turbine, a gas turbine, a generator, a heat recovery boiler, an aircraft engine and a gear unit (Haseley et al., Abstract and col. 3, lines 7-18)

Response to Arguments

14. Upon further consideration, the allowable subject matter of claims 24 and 54 as indicated in the last Office Action mailed on 03/12/2004 has been

withdrawn per MPEP 2173.05(h), Markush-type claims. A detailed new office action is set forth above. Any inconvenience to the Applicant(s) is regretted.

Contact Information

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Xiuqin Sun whose telephone number is (571)272-2280. The examiner can normally be reached on 6:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on (571)272-2269. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Xiuqin Sun
Examiner
Art Unit 2863

XS
June 3, 2004

BRYAN BUI
PRIMARY EXAMINER